RESEARCH REVIEW TEAM DATA REQUEST

Meteorological Development Laboratory (MDL) Response

1.) Please provide a copy of the most resent evaluation of the lab or center in pdf format. Was this review internal or external?

An external evaluation was organized by the Office of Science & Technology in 2003: A copy of the final report is attached (MDLFinalReport.pdf).

2.) Please provide a brief history, and mission of your laboratory /center.

The Meteorological Development Laboratory (MDL) was formed as the Techniques Development Laboratory in 1964; the name MDL, with essentially the same mission, was established in the recent reorganization under General Jack Kelly. The mission statement as established in an Office of Science and Technology off-site after the reorganization is:

- Develop and implement scientific techniques for NWS operations
- Furnish full spectrum of interpretive forecast guidance
- Provide interactive tools for decision assistance and forecast preparation
- Conduct comprehensive evaluations of NWS products

3.) Please provide a listing of major customers of the laboratory /center, with a one sentence description of what is being done for them.

Our internal customers are the NWS operational offices and NWS forecasters. For them, we provide services according to the mission stated above.

External organizations take benefit from our products, including the military and private sector (weather companies, broadcast meteorologists, and weather-sensitive industries). However, our requirements are not provided by them, nor do we receive non-NOAA funds.

4.) Please provide a summary of research being conducted (Your list of major requirements from the Program Baseline Assessments (PBA) maybe helpful in answering this question.)

4a. For each research theme identified above, include a brief explanation of how this research relates to NOAA program areas. (The program areas are those identified in the recent Program Baseline Assessment.)

Statistical Modeling:

MDL develops a full suite of deterministic and probabilistic weather guidance products (e.g., maximum temperature, probability of precipitation) for projections of 1 hour to 7 days. MDL exploits a range of proven (e.g. Model Output Statistics (MOS)) and new techniques (gridded MOS) to develop products based on the output of NCEP's numerical models. Some of these post-processing techniques are implemented centrally on NCEP's mainframe computers and some on local AWIPS computers. The statistical models used for these interpretive products compliment the numerical models used by NCEP.

This work directly contributes to both Mission Goals Local Forecasts and Warnings and Environmental Modeling. The guidance provided by MDL is an essential part of the NWS forecast process, and is relied on heavily by forecasters.

Decision Assistance:

MDL develops techniques to synthesize, display, and manipulate data and guidance from various sources to aid NWS forecasters and other users in interpreting the wealth of information available to them. For instance, techniques for automatically monitoring weather observations and forecasts are developed and implemented to alert the forecaster of the need to update warning and forecast products, especially for dangerous weather. Prototyping of promising techniques in an operational setting is done to identify those best suited for implementation and to accelerate NWS technology infusion activities.

This work directly contributes to Mission Goal Local Forecasts and Warnings. The techniques developed and implemented on AWIPS are used in the monitoring of storms and their possible impacts. For instance, MDL implemented a flash flood monitoring and prediction system that operates at a small stream basin level using methods previously developed.

Extratropical & Hurricane Storm Surge:

MDL improves the hurricane storm surge prediction model (SLOSH) used by the NWS, especially the National Hurricane Center and the Tropical Prediction Center. This requires the updating of bathymetry and elevation data on a regular basis as levees, etc. are built, and as better data become available. Known techniques of data analysis are used. The results of SLOSH are made available as maps of maximum inundation that can be expected of hurricane surge that are used by emergency managers and insurance interests. In addition, the results of SLOSH are available in real time to forecasters in preparing watches and warnings. Display programs are developed for personal computers and provided to users who need to make use of the available SLOSH data. A much simpler model was developed and implemented for predicting extratropical storm surge; in this model, the surge and waves are driven by winds output by the NCEP numerical models.

This work directly supports Mission Goal Environmental Modeling. The SLOSH model implements the hydodynamical equations and predicts water level due to winds and pressures in a hurricane or typhoon. The basic model was developed a number of years ago, and it is largely in a maintenance mode. However, this necessary maintenance allows the model to keep current with the latest and best data available, and therefore to make better predictions. MDL is currently engaged in a prototype system to make probabilistic surge predictions, and will have this prototype running within a year. In addition, the action of waves is

being included in the SLOSH output, the basic modeling having been accomplished previously.

Automated Product Preparation

MDL supports NWS automated product preparation. The NWS has just implemented the Interactive Forecast Preparation System (IFPS) at all CONUS Weather Forecast Offices and is in the process of implementing IFPS in Alaska and Hawaii. MDL has the lead in the endeavor, and has worked with other groups in NOAA, including the Forecast System Laboratory (FSL), for implementation. MDL also has developed the new National Digital Forecast Database (NDFD) which houses in mosaic form the grids prepared by WFOs. Through IFPS, each WFO produces grids of sensible weather and stores them into a local database. Products from this database are automatically prepared by software developed by MDL; this effort is being transitioned to field developed software. In addition, the local grids are sent to a central server, the NDFD server, and are merged into national grids. These grids are being made available to customers and partners with software developed by MDL. New formats and methods of dissemination are being developed and brought on line.

This work supports Mission Goal Local Forecasts and Warnings. Preparation of forecasts and warnings is an end product of the NWS, and this work contributes in their production both locally and nationally.

Verification

MDL develops, implements and maintains a forecast verification system. This system provides statistics to the NWS Verification Program Manager and to forecasters through web-based products. This system supports the verification of public and aviation forecasts. Ongoing research drives system expansion and the inclusion of gridded forecasts in the NDFD. This verification will be used in the monitoring of the NDFD in real time for feedback to forecasters. Verification of inundation from storms is done to assess the accuracy of the predictions and to identify weaknesses.

This work supports both Mission Goals Local Forecasts and Warnings and Environmental Monitoring. Knowing the quality of forecast products is indispensable for management, users, and forecasts.

4b. Provide the geographic scope of your research - regional, national, global.

All are both regional and national.

4c Provide the time frames of your research - short term, (0-2 years), medium term, (2-5 years), long term (greater than 5 years).

All are short term.

5.) Please provide a listing of 3-5 major accomplishments in the last five years.

- Expanded our Model Output Statistics (MOS) product suite in several ways (more locations, more projections, more weather elements, more models), and increased accuracy.

- Led in implementing the Interactive Forecast Preparation System (IFPS).

- Established the National Digital Forecast Database (NDFD).

- Developed and implemented the System for Convection Analysis and Nowcasting and the Flash Flood Monitoring and Prediction System.

- Updated seven basins for forecasting hurricane storm surge with the SLOSH model.

6.) Please provide a summary of legal mandates for the work in the laboratory/center.

All MDL research contributes to the mission of saving life and property. In terms of the Mission Goal and NOAA Strategic research outcomes

- Serve society's needs for weather and water information,

- Support the Nation's commerce with safe, efficient, and environmentally sound transportation

7.) Attached in Excel format is the compilation of financial and staffing data that your laboratory or line office provided. Please verify that data are correct.

Yes, correct.

In your response please identify a contact person and a telephone number, in case clarifying information is needed.

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